

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. Cancelled.

2. (Currently Amended) The method of claim 3 wherein the received vector comprises at least one code division multiple access signal and the estimated desired portion of the data produces a portion of a spread data vector.

3. (Currently Amended) ~~The method of claim 1 further comprising~~ A method for data estimation in a wireless communications system, the method comprising:

producing a received vector;

determining a past, a center and a future portion of a channel estimate matrix for a desired portion of the data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion associated with a portion of the received vector associated with the desired data portion;

estimating the desired portion of the data without effectively truncating detected data using a minimum mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector;

using the past and future portions of the channel estimate matrix for adjusting factors in the minimum mean square error algorithm; and

adjusting the received vector prior to input into the minimum mean square error algorithm using the past portion of the channel estimate matrix and data previously estimated for a portion of the received vector associated with the past portion of the channel estimate matrix.

4. (Original) The method of claim 3 wherein the adjusting the received vector is by subtracting a multiplication of the past portion of the channel estimate matrix with the previously estimated data from the received vector.

5. (Currently Amended) The method of claim 3 ~~4~~ wherein the data estimation is performed using a sliding window approach and the desired portion of data of the received vector is a center portion of the window.

6. (Currently Amended) ~~The method of claim 1 further comprising~~ A method for data estimation in a wireless communications system, the method comprising:
producing a received vector;

determining a past, a center and a future portion of a channel estimate matrix for a desired portion of the data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion associated with a portion of the received vector associated with the desired data portion;

estimating the desired portion of the data without effectively truncating detected data using a minimum mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector;

using the past and future portions of the channel estimate matrix for adjusting factors in the minimum mean square error algorithm; and

producing a noise factor using the prior channel estimate matrix, the future channel estimate matrix and an auto correlation of the noise and the inputs into the minimum mean square error algorithm are the noise factor, the center portion of the channel estimate matrix and the portion of the received vector.

7. Cancelled.

8. (Currently Amended) The wireless transmit/receive unit of claim 9 7 wherein the receiver component is configured to produce a received vector that comprises at least one code division multiple access signal and the data estimation component is configured to estimate the estimated desired portion of the data to produce ~~produces~~ a portion of a spread data vector.

9. (Currently Amended) ~~The wireless transmit/receive unit of claim 7 wherein~~ A wireless transmit/receive unit comprising:

a receiver component configured to produce a received vector;

a matrix determination component configured to determine a past, a center and a future portion of a channel estimate matrix of a desired portion of data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion

associated with a portion of the received vector associated with the desired data portion;

a data estimation component configured to estimate the desired portion of the data without effectively truncating detected data, the estimating the desired portion of the data uses a minimum mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector;

the data estimation component configured to use the past and future portions of the channel estimate matrix for adjusting factors in the minimum mean square error algorithm; and

the data estimation component configured to adjust the received vector is ~~adjusted~~ prior to input into the minimum mean square error algorithm using the past portion of the channel estimate matrix and data previously estimated for a portion of the received vector associated with the past portion of the channel estimate matrix.

10. (Currently Amended) The wireless transmit/receive unit of claim 9 wherein the data estimation component is configured to adjust ~~adjusting~~ the received vector ~~is~~ by subtracting a multiplication of the past portion of the channel estimate matrix with the previously estimated data from the received vector.

11. (Currently Amended) The wireless transmit/receive unit of claim 9 ~~7~~ wherein the data estimation component configured to estimate ~~data estimation is performed~~ using a sliding window approach where ~~and~~ the desired portion of data of the received vector is a center portion of the window.

12. (Currently Amended) ~~The wireless transmit/receive unit of claim 7~~
~~wherein~~ A wireless transmit/receive unit comprising:

a receiver component configured to produce a received vector;

a matrix determination component configured to determine a past, a center and a future portion of a channel estimate matrix of a desired portion of data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion associated with a portion of the received vector associated with the desired data portion;

a data estimation component configured to estimate the desired portion of the data without effectively truncating detected data, the estimating the desired portion of the data uses a minimum mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector;

the data estimation component configured to use the past and future portions of the channel estimate matrix for adjusting factors in the minimum mean square error algorithm; and

a component configured to produce a noise factor ~~is produced~~ using the prior channel estimate matrix, the future channel estimate matrix and an auto correlation of the noise and the inputs into the minimum mean square error algorithm are the noise factor, the center portion of the channel estimate matrix and the portion of the received vector.

13. Cancelled.

14. (Currently Amended) The wireless transmit/receive unit of claim ~~15~~ 13 wherein the received vector comprises at least one code division multiple access signal and the minimum mean square error device configured to estimate the estimated desired portion of the data to produce produces a portion of a spread data vector.

15. (Currently Amended) ~~The wireless transmit/receive unit of claim 13 wherein~~ A wireless transmit/receive unit configured to receive at least one signal and to produce a received vector therefrom, the wireless transmit/receive unit comprising:

a channel estimation matrix device configured to determine a past, a center and a future portion of a channel estimate matrix of a desired portion of data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion associated with a portion of the received vector associated with the desired data portion;

a minimum mean square error device configured to estimate the desired portion of the data without effectively truncating detected data using a minimum mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector, wherein the past and future portions of the channel estimate matrix are used for adjusting factors in the minimum mean square error algorithm; and

an adjustment device configured to adjust the received vector is adjusted prior to input into the minimum mean square error device by algorithm using the past portion of the channel estimate matrix and data previously estimated for a

portion of the received vector associated with the past portion of the channel estimate matrix.

16. (Currently Amended) The wireless transmit/receive unit of claim 15 wherein the adjustment device is configured to adjust ~~adjusting~~ the received vector ~~is~~ by subtracting a multiplication of the past portion of the channel estimate matrix with the previously estimated data from the received vector.

17. (Currently Amended) The wireless transmit/receive unit of claim ~~15~~ ~~13~~ wherein the minimum mean square error device configured to estimate the data ~~estimation is performed~~ using a sliding window approach where ~~and~~ the desired portion of data of the received vector is a center portion of the window.

18. (Currently Amended) ~~The wireless transmit/receive unit of claim 13 wherein~~ A wireless transmit/receive unit configured to receive at least one signal and to produce a received vector therefrom, the wireless transmit/receive unit comprising:

a channel estimation matrix device configured to determine a past, a center and a future portion of a channel estimate matrix of a desired portion of data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion associated with a portion of the received vector associated with the desired data portion;

a minimum mean square error device configured to estimate the desired portion of the data without effectively truncating detected data using a minimum

mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector, wherein the past and future portions of the channel estimate matrix are used for adjusting factors in the minimum mean square error algorithm; and

a noise factor device configured to produce a noise factor ~~is produced~~ using the prior channel estimate matrix, the future channel estimate matrix and an auto correlation of the noise and the inputs into the minimum mean square error algorithm are the noise factor, the center portion of the channel estimate matrix and the portion of the received vector.

19. Cancelled

20. (Currently Amended) The base station of claim 21 ~~19~~ wherein the receiver component is configured to produce a received vector that comprises at least one code division multiple access signal and the data estimation component is configured to estimate the ~~estimated~~ desired portion of the data to produce ~~produces~~ a portion of a spread data vector.

21. (Currently Amended) ~~The base station of claim 19 wherein~~ A base station comprising:

a receiver component configured to produce a received vector;

a matrix determination component configured to determine a past, a center and a future portion of a channel estimate matrix of a desired portion of data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion

associated with a portion of the received vector associated with the desired data portion;

a data estimation component configured to estimate the desired portion of the data without effectively truncating detected data, the estimating the desired portion of the data uses a minimum mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector;

the data estimation component configured to use the past and future portions of the channel estimate matrix for adjusting factors in the minimum mean square error algorithm; and

the data estimation component configured to adjust the received vector is ~~adjusted~~ prior to input into the minimum mean square error algorithm using the past portion of the channel estimate matrix and data previously estimated for a portion of the received vector associated with the past portion of the channel estimate matrix.

22. (Currently Amended) The base station of claim 21 wherein the data estimation component is configured to adjust ~~adjusting~~ the received vector is by subtracting a multiplication of the past portion of the channel estimate matrix with the previously estimated data from the received vector.

23. (Currently Amended) The base station of claim 21 ~~19~~ wherein the data estimation component configured to estimate ~~data estimation is performed~~ using a sliding window approach where ~~and~~ data estimation is performed using a sliding window approach and the desired portion of data of the received vector is a center portion of the window.

24. (Currently Amended) ~~The base station of claim 19 wherein~~ A base station comprising:

a receiver component configured to produce a received vector;

a matrix determination component configured to determine a past, a center and a future portion of a channel estimate matrix of a desired portion of data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion associated with a portion of the received vector associated with the desired data portion;

a data estimation component configured to estimate the desired portion of the data without effectively truncating detected data, the estimating the desired portion of the data uses a minimum mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector;

the data estimation component configured to use the past and future portions of the channel estimate matrix for adjusting factors in the minimum mean square error algorithm; and

a component configured to produce a noise factor is produced using the prior channel estimate matrix, the future channel estimate matrix and an auto correlation of the noise and the inputs into the minimum mean square error algorithm are the noise factor, the center portion of the channel estimate matrix and the portion of the received vector.

25. Cancelled.

26. (Currently Amended) The base station of claim ~~27~~ ~~25~~ wherein the received vector comprises at least one code division multiple access signal and the minimum mean square error device configured to estimate the ~~estimated~~ desired portion of the data to produce ~~produces~~ a portion of a spread data vector.

27. (Currently Amended) ~~The base station of claim 25 wherein~~ A base station configured to receive at least one signal and to produce a received vector therefrom,
the wireless transmit/receive unit comprising:

a channel estimation matrix device configured to determine a past, a center and a future portion of a channel estimate matrix of a desired portion of data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion associated with a portion of the received vector associated with the desired data portion;

a minimum mean square error device configured to estimate the desired portion of the data without effectively truncating detected data using a minimum mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector, wherein the past and future portions of the channel estimate matrix are used for adjusting factors in the minimum mean square error algorithm; and

an adjustment device configured to adjust the received vector ~~is adjusted~~ prior to input into the minimum mean square error device by algorithm ~~using the~~ past portion of the channel estimate matrix and data previously estimated for a portion of the received vector associated with the past portion of the channel estimate matrix.

28. (Currently Amended) The base station of claim 27 wherein the adjustment device is configured to adjust ~~adjusting~~ the received vector ~~is by~~ subtracting a multiplication of the past portion of the channel estimate matrix with the previously estimated data from the received vector.

29. (Currently Amended) The base station of claim 27 ~~25~~ wherein the minimum mean square error device configured to estimate the data ~~estimation is performed~~ using a sliding window approach where ~~and~~ the desired portion of data of the received vector is a center portion of the window.

30. (Currently Amended) ~~The base station of claim 25 wherein~~ A base station configured to receive at least one signal and to produce a received vector therefrom, the wireless transmit/receive unit comprising:

a channel estimation matrix device configured to determine a past, a center and a future portion of a channel estimate matrix of a desired portion of data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion associated with a portion of the received vector associated with the desired data portion;

a minimum mean square error device configured to estimate the desired portion of the data without effectively truncating detected data using a minimum mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector, wherein the past and future

portions of the channel estimate matrix are used for adjusting factors in the minimum mean square error algorithm; and

a noise factor device configured to produce a noise factor ~~is produced~~ using the prior channel estimate matrix, the future channel estimate matrix and an auto correlation of the noise and the inputs into the minimum mean square error algorithm are the noise factor, the center portion of the channel estimate matrix and the portion of the received vector.

31. (Original) An integrated circuit comprising:

- an input configured to receive a received vector;
- a channel estimation device producing a prior, center and future portion of a channel response matrix using the received vector;
- a future noise auto-correlation device for receiving the future portion of the channel response matrix and producing a future noise auto-correlation factor;
- a noise auto-correlation device producing a noise auto-correlation factor using the received vector;
- a summer for summing the future noise auto-correlation factor with the noise auto-correlation factor;
- a past input correction device for receiving the prior portion of the channel response matrix and prior detected data to produce a past input correction factor;
- a subtractor subtracting the past input correction factor from the received vector; and
- a minimum mean square error device for receiving an output of the summer, an output of the subtractor and the center portion of the channel estimate matrix, the minimum mean square error device producing estimated data.

32. (Original) An integrated circuit comprising:
an input configured to receive a received vector;
a channel estimation device producing a prior, center and future portion of a channel response matrix using the received vector;
a noise auto-correlation correction device for receiving the future and prior portions of the channel response matrix and producing a noise auto-correlation correction factor;
a noise auto-correlation device producing a noise auto-correlation factor using the received vector;
a summer for summing the noise auto-correlation factor with the noise auto-correlation correction factor;
a minimum mean square error device for receiving an output of the summer, the center portion of the channel estimate matrix and the received vector, the minimum mean square error device producing estimated data.